⩾5 mm (n = 1690); 16 Gy if 1−5 mm margins (n = 391); 20 Gy in case of close (⩽1 mm) or positive margins (n = 92).

Results: Median age of the series was 57 years (range 22−86). 1 763 patients were pT1 and 410 pT2; nodal status was positive in 26%. Hormonal receptor status was positive in 75% of patients.

At a mean follow up of 8.5 years (range 3−20), 43 patients (2.0%) experienced LR and 126 distant metastases (DM = 5.8%) were diagnosed. Mean time to LR was 4.1 years (range 0.6−16; SD = 2.98); mean time to DM was 3.4 years (range 0.6−14; SD = 2.46).

Concerning LR, 10 Gy boost group relapsed in 1.8%; 16 Gy boost group in 2.3% and 20 Gy boost group in 2.2%. Differences were no statistically significant (Chi-square test p = 0.097). Concerning DM, events rate was no significantly influenced by different RT boost dose (p = 0.26).

Conclusions: Although the appropriate boost dose still remains a debated issue, our analysis validated the local guidelines of the institution, showing that different boost doses based on surgical margins do not influence LR rate of BC patients.

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Accelerated Partial Breast Irradiation with Intensity-modulated Radiotherapy (IMRT): the Florence Phase III Randomized Clinical Trial at 3 Years Median Follow-up

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Background: Long-term evidence from prospective randomized trials demonstrated that breast-conserving surgery (BCS) followed by whole breast radiotherapy (RT) is comparable to mastectomy in treatment of early breast carcinoma (BC). The majority of BC recurrence seems to occur near the surgical bed; this finding led to an interest in adjuvant accelerated partial breast irradiation (APBI), that is hypothesized to be safe to deliver larger RT doses in smaller high-risk breast volume. In particular intensity-modulated radiotherapy (IMRT) is able to improve on three-dimensional conformal planning technique by using inverse planning algorithms for optimal dose delivery to small target volumes, sparing surrounding normal tissues.

We evaluate with a Phase III randomized clinical trial the efficacy and safety of treating the index quadrant with external IMRT, in a highly selected group of patients affected by early-stage BC.

Material and Methods: For IMRT, the clinical target volume was drawn with a uniform 1 cm margin around the surgical clips in three dimensions. The ipsilateral and contralateral breast, ipsilateral and contralateral lung, heart, and spinal cord were contoured as organs at risk. All the regions of interest were contoured according to the International Commission on Radiation Units and Measurements reports 50 and 62 recommendations.

The Florence trial has been conducted from September 2005, to compare conventional fractionated whole-breast treatment (Arm A; n = 209), with APBI using IMRT technique (Arm B; n = 199). Arm A patients received a total dose of 50 Gy in 2 Gy consecutive fractions (5 weeks treatment), plus 10 Gy boost to surgical bed; Arm B patients received a total dose of 30 Gy in 6 Gy non-consecutive fractions (10 days treatment).

Results: In June 2011, 408 patients were randomized and treated. At a median follow-up of 3 years (range 0.3−6.4), the rate of Grade 1 and Grade 2 acute skin toxicity in Arm A (using Radiation Therapy Oncology Group scale) was 25% and 20%, respectively. The tolerance in Arm B was excellent with only 6% Grade 1 and 2% Grade 2 acute skin toxicity. The local recurrence rate was 0.5% in Arm A (1/209) and 1.5% in Arm B (3/199). The distant metastases rate was 2% in Arm A (4/209) and 0.5% in Arm B (1/199).

Conclusions: The interim analysis of the Florence trial at 3 years median follow-up seems to confirm that APBI represents a safe and effective treatment in early BC patients.

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Forward Planning Versus Inverse Planning of Multi-lumen MammoSite Brachytherapy

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Background: Multi-lumen MammoSite^R (ML-MS) improves target coverage and reduced Organs at Risk (OAR) dose compared to single-lumen MammoSite^R. Inverse planning can be used to optimise ML-MS but resulting source positioning and dwell times may be unintuitive and sometimes result in unexpected regions of high and low dose. ML-MS optimisation using a Forward Planned Individualised Plan (FPIP) was compared with Inverse planning simulated annealing (IPSA) for target coverage, OAR dose and planning time.

Materials and Methods: CT datasets of twelve consecutive patients who participated in the FORUM (Feasibility Of breast Radiotherapy Using MammoSite) trial were used. All planning was carried out using Oncentra Masterplan treatment planning software. IPSA was completed using the optimisation package with constraints set to achieve required PTV coverage as priority. FPIP was completed using a standard line source plan as a starting point. The standard line source plan was devised locally using the symmetrical average of 7 patients planned using a single lumen catheter. All patients were planned with the dose constraints of PTV D_{95} ⩾95%, skin and rib maximum dose ⩽125%, Breast V150 ⩽50 cc and V200 ⩽10 cc. V_5 heart, Dose Homogeneity index (DHI), Full Width Half Maximum (FWHM) of the PTV differential DVH and planning time were recorded for all patients.

Results: The mean PTV D_{95}, maximum rib and skin dose and V_5 heart were comparable for IPSA and FPIP (table1). IPSA fulfilled all dosimetric constraints in 6/12 patients as compared to 7/12 patients with FPIP. 5/12 patients who failed the maximum skin dose constraint had balloon-skin distance of ⩽9 mm. The DHI and FWHM were similar with the two techniques. The average planning time was 5 minutes with IPSA compared to 12 minutes with FPIP.

Conclusions: FPIP optimisation of ML-MS is comparable to IPSA for target coverage and OAR dose. ML-MS can be used in centres without commercially available inverse planning software with an acceptable average planning time.

Table 1. Comparison between Inverse Planning (IPSA) and Forward planned Individualised Plan (FPIP)

	IPSA (mean)	FPIP (mean)
PTV D95	96.6	96.3
Maximum Rib dose	119%	121%
Maximum Skin dose	118%	114%
Heart V5	13.6%	12.9%
HI	0.62	0.62
FWHM	218	216

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3D-conformal Partial Breast Irradiation (3D-CRT PBI): How to Optimize Its Reproducibility

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Background: To report how 2D or 3D Image Guided RT (IGRT) and surgical clips located in the tumoral bed can avoid target missing in 3D-CRT PBI.

Materials and Methods: Seventeen patients (pts) treated with tumorectomy plus sentinel node biopsy for stage I-II breast cancer were randomized in a phase III trial to receive PBI with 3D-CRT (IRMA trial). Five radiopaque clips (1 in the center of the surgical cavity and the others at 4 cardinal points) were placed immediately after surgery to correcly delineate the surgical bed and were used as reference markers for IGRT, either 2D or 3D modality. RT was given twice per day, 10 fractions in 5 days (total ICRU dose 38.5 Gy). Checks were obtained before every treatment with CBCT in 10 pts and KV 0º-180º in the 7 pts treated with respiration gated RT. The surgical clips matching was performed with the planning CT ones.

Results: We registered the isocenter shifts along the longitudinal, vertical and lateral axes before each RT session. The mean and median vertical shifts were 0.27 and 0.3 cm, the longitudinal ones 0.23 and 0 cm, the lateral ones 0.32 and 0.15 cm respectively.

Conclusions: The use of optimal IGRT reduces the uncertainties due to breathing and patient motion in 3D-CRT PBI and allows us to prescribe this treatment as a valid and daily reproducible alternative to brachytherapy or intraoperative PBI.

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Retrospective Analysis of Postmastectomy Adjuvant Radiotherapy in Patients with Less Than Four Axillary Lymph Nodes

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Background: There is no consensus as yet regarding post mastectomy radiotherapy (PMRT) for patients with <5 cm tumor having less than 4